problem: prove that $x \cap (x \cup y) = x \cap y$

Step 1: Divide the problem into left and right sides.

Left side	Right side
$x \cup (x \cap y)$	$(x \cap y)$

Step 2: Look at left side of equation.

$$x \cup (x \cap y)$$ $$x \cap (x \cup y)$$

The left side has 3 parts. The first part says to shade in x. The second part says to shade in x. The third part says to shade in y. The intersection sign (∩) means "and" so we need to shade in only the parts that x and y have in common, which is the shaded portion. Finally, the $\cup$ sign (union) means "or" so everything gets shaded in. By looking at the parts shaded in by $(x \cap y)$ and x and putting them together, the x and y part gets shaded, leaving the entire shaded region.

Step 3: Look at right side of equation.

$$x \cap (x \cup y)$$

This side, following a similar procedure, means that x and x or y. We shade in the elements that x and $(x \cup y)$ have in common, which is the shaded region.
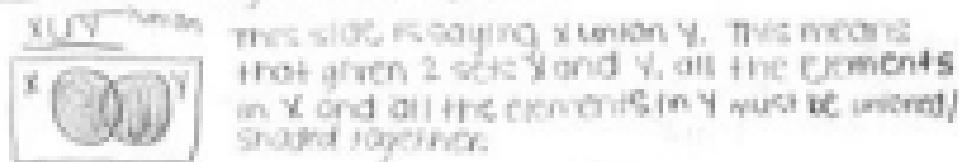
Step 4: Put the results of equation back together.

$$x \cup (x \cap y) = (x \cap y)$$

By comparing the diagrams of the left and right sides, you can see that they are the same shaded region. The two sides are equal. These proofs that equation is true.